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Luncheon Address by
James E. Webb, Administrator
National Aeronautics and Space Administration

THE EXECUTIVES' CLUB OF CHICAGO
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"U.S. Space Policy and Implementation: 1961"

Just two weeks ago today, the initial test-flight of the first stage of the giant Saturn booster was launched from Cape Canaveral.

The test was a great success.

Millions of Americans -- including, I am sure, many of you -- saw it on television, as I did, and must have had the same sense of pride I felt. It was awe-inspiring to watch that great vehicle, balanced on top of its pillar of rocket flame and smoke, accelerating smoothly and vanishing in the sky.

The flight soared nearly 85 miles above the earth's surface and reached a peak of 3,590 miles per hour. The vehicle came down in a little less than eight minutes in the Atlantic, 215 miles downrange from the Cape.

We plan nine more test launchings during the next several years to prepare Saturn for its first mission -- the orbiting of a three-man spacecraft around the earth as the initial operational step in Project Apollo, the U.S. program for manned flight to the moon.

Some of the facts related to the test are as impressive as the flight itself. The eight engines clustered to make up the first stage delivered about 1,300,000 pounds of thrust at lift-off. Translated roughly, it amounted to about 28,000,000 horsepower or the full power potential of more than 100,000 standard 1961 automobiles. This power was delivered in a little under four seconds of burning time.

On the launching pad at the Cape, Saturn stood 162 feet high, 10 feet taller than the Statue of Liberty. Dummy second and third stages, filled with water, were mounted above the first stage to simulate the dimensions and weight of the Saturn combination when its development is complete. The vehicle weighed about 460 tons at lift-off, of which 300 tons was kerosene-liquid oxygen fuel and oxidizer.

The Saturn flight was a major milestone in our national space effort. On May 25, you recall, President Kennedy recommended to Congress a speeding-up generally of the program. The key objective is to achieve undoubted mastery in space exploration, with emphasis on using American astronauts for scientific explorations on the moon.

Congress endorsed the national program and appropriated $1,671,750,000 for NASA's Fiscal Year 1962 activities. It is important to recognize that the program was presented by the President and handled by the Congress in a completely bipartisan or non-partisan basis.

Funds were included to accelerate development of large rocket engines and space vehicles; for speeding up exploration of the environments of the earth, the moon, and the space between; to expedite the Rover nuclear rocket engine; and to expedite the development of weather and communication satellite systems.

May I emphasize that 80 cents out of every dollar NASA spends goes for contracts with industry and private organizations, for materials, supplies, salaries, research, development, and many other services.

The 1962 program is approximately twice the size of that for 1961. We expect funding requirements to double again in 1963 if we are to meet our national goals.

There are many urgent reasons why this country has decided to invest heavily in this long-term program to win space supremacy. If the Soviets decisively outstripped us, their space technology would be used to develop their total national capability and to apply pressure on us and other Free World nations.

This we cannot permit. It is not in our national character to be bystanders in this vast and dynamic new venture that promises to return such a wealth of practical benefits to our country and to all men. Moreover, we cannot allow our international standing in science and technology to slip to second place. There is strong evidence that in the eyes of the world space achievements have come to symbolize over-all accomplishments in science, technology, and national progress.

These are among the chief reasons why the nation has decided to go to the heart of the matter -- to marshal our resources with fixed determination to achieve first place in manned exploration of the solar system and to meet its challenges, whatever they may be.

Project Mercury, the first phase of the United States program for manned space flight, will place an astronaut in orbit around the earth. We will learn how man can withstand prolonged weightlessness, how well he can pilot a spacecraft, what he can observe to supplement the information recorded by electronic sensors. The astronaut-pilot will be able to sense and report his own reactions to conditions in space while ground observers follow these reactions by radio and television.

Two suborbital Mercury flights were accomplished by Astronauts Alan Shepard and Virgil Grissom several months ago. We expect to carry out the first orbital mission late this year or early next year.

A later phase of the manned space flight program which we call Apollo, will lead to the three-astronaut expedition to the moon. Apollo will require advanced space techniques. Results of the pioneer Mercury experiments will be incorporated in coming generations of spacecraft.

Apollo spacecraft will be mounted on top of Saturn vehicles for earth-orbit and moon-orbit missions. Even more powerful rocket vehicles may be employed for the landing on the moon. Therefore, the Apollo craft must be built to withstand much greater launch thrusts, vibration, and stress than was the case with the Mercury spacecraft. It must be capable of accurate guidance over the 240,000-mile course to the moon. It must be able to land gently on the lunar surface, and then be launched from the moon and guided back for safe return into the earth's atmosphere at the speed of 25,000 miles per hour -- almost five times the peak speed of Alan Shepard's flight last May.

According to our scientists, this atmospheric entry speed will subject the Apollo spacecraft to extreme heat peaks of about 5,000 to 6,000 degrees Fahrenheit -- or twice that of the hottest blast furnace. Not only must the structure withstand the heat developed by friction with the atmosphere and absorption from the sun's rays, but insulation and protective cooling must be perfected to maintain bearable temperature for the astronauts inside.

Like other achievements in space, the Apollo flights will be a step-by-step process. The spacecraft will first be flown in orbit around the earth so that the many components and systems of the vehicle can be tested and evaluated. Earth-orbiting flights will also be used for training the space crew and for development of operational techniques. Each will also include important scientific experiments.

As the competence of the Apollo vehicle and the men who will operate it increases, the flights will go farther and farther from earth, and will be of longer duration and greater complexity. A major step will be a manned flight around the moon, on which the crew will perform many of the guidance and control tasks that will be needed later on in the lunar landing mission.

As earlier noted, the launch vehicle for Apollo's earth orbit and circumlunar flights will be Saturn. The cluster of eight engines in the first stage will provide one and one-half million pounds of thrust for more than two minutes compared with the 360,000 pounds of thrust provided by the Atlas booster for Mercury flights.

A giant clustered booster called Nova -- which will develop 12 million or more pounds of thrust -- may be required for the lunar landing itself. Another possible approach involves the use of an advanced version of the Saturn, with the Apollo spacecraft constructed in space after it is launched into orbit where the segments will be joined together. We are studying the technology that both possibilities will require.

The past months have been a time of many decisions in the U.S. space program. Even before Congressional action on funds was completed, NASA began making a series of major decisions. We had to make them promptly. We analyzed the job -- including more than 2,000 separate problems -- with the help of modern computing machines and advanced programming techniques as used in the Polaris missile program, and employed by the du Pont Company and other firms.

We learned immediately that one of the pacing items is the construction of facilities. And there is one thing you must do before building facilities. You must decide where to build them.

Three months after The President's May 25th message, on August 24, we announced that the Cape Canaveral rocket launching reservation would be enlarged to more than five times its existing size to meet requirements of the very large boosters for the manned lunar program. This decision resulted from the work of a joint NASA-Air Force survey team which had been established to analyze launch requirements and establish the basis for selecting the launching site.

The total cost of expanding Cape Canaveral is estimated at $885 million, of which $700 million is for mission facilities, $125 million for launch support facilities, and $60 million for purchase of 80,000 additional acres.

The added real estate will help provide a buffer zone of seven to 10 miles to protect populated areas from the noise and blast of testing and launching.

The expansion at Cape Canaveral will provide room for the construction of six or more Saturn or Nova-class launch complexes.

Two weeks later, on September 7, we announced the selection of the Government-owned Michoud Ordnance Plant, near New Orleans, as a fabrication site for large launch vehicle stages. The plant will be used for production of the first stage of the Saturn booster. Michoud, which had been in standby status for several years, will be operated by an industrial contractor under the technical direction of NASA's Marshall Space Flight Center. The plant will also be used to fabricate first stages of boosters larger than the initial version of Saturn. Plans call for the plant to be in operation by early fall of 1962.

Michoud occupies 864 acres of land on the eastern outskirts of New Orleans, adjacent to Michoud Canal, which is large enough for ocean-going barges. The canal connects with the Gulf Intracoastal Waterway, and with the Mississippi River Gulf Outlet Canal, now under construction. Also, we have selected 13,500 acres in southwest Mississippi near the Michoud plant, to be used to ground-test large rockets. In addition, NASA is acquiring rights to about 128,000 surrounding acres in Mississippi and Louisiana as a noise and blast buffer zone.

On September 19, we announced the choice of a thousand acres in Harris County, Texas, at the edge of Houston, as the site of NASA's new Manned Spacecraft Center, for which $60 million has been appropriated this year. This facility will be the command center for the manned lunar landing expedition and for succeeding manned space flight missions. Construction will start soon and the laboratory will be operational in 1964. The staff is being assembled immediately and will be housed in temporary quarters in Houston.

The selection of Houston completes a complex of four locations at warm-water ports around the Gulf of Mexico, connected by deep-water transportation and supplementing the major facilities we have at Huntsville, Alabama -- the Marshall Space Flight Center, managed by Dr. Wernher von Braun. In this complex, it will be possible to work most of the year outdoors and to transport by water the large spacecraft units involved in the Apollo project. It will be possible, in fact, to develop such larger spacecraft as multi-manned, earth-orbiting space stations. These larger craft can be transported directly from Houston to Cape Canaveral or to the Michoud works by water.

The NASA Manned Spacecraft Center personnel will move, group by group, to Houston from Langley Research Center in Virginia.

Late in September, we completed a reorganization of NASA to provide better focus and greater emphasis on major programs and to provide increased voice in policy-making and program decisions for directors of the research and development centers. The changes -- which went into effect on November 1 -- also enable NASA general management to exercise greater control over programs.

The directors of the nine NASA field centers now report directly to general management instead of to one of the headquarters program offices. Four new headquarters program offices were created which will have the responsibility for carrying out their programs in the most expeditious way, drawing on industrial, university, or governmental resources as needed. They will establish technical guidelines, budget and program funds, schedule each project, and evaluate progress.

The U.S. space program, as now organized, is truly a national effort. The objective of manned lunar exploration within the shortest time possible requires the planning and fitting together of a large number of actions, a systematic organization of the effort, and a constant evaluation of progress. The results, and the effectiveness of the men and means employed, must be constantly reviewed by a leadership capable of hard-boiled adjustment to overcome deficiencies and to exploit opportunities as they arise.

Some of our nation's best qualified men, who have made important contributions to our national aerospace position in our universities and industry, have accepted leading roles in our space program. These men bring the highest personal, technical, and professional qualifications to our effort. There is the old saying in American industry that if you want to make soap, you have to get a man who knows how to make soap. These men, and many others associated with them, know the technical side of aeronautics and space and are all experienced in the management of large activities. Each has demonstrated a personal earning capacity far beyond what the Government is able to pay for their services. Each is thoroughly familiar with the opportunities and problems associated with our most advanced and important technical development efforts.

It is fortunate for this nation that men with these high qualifications and such experience are willing to forego large earnings in industry and normal personal and family life to supply the leadership needed in our national space effort.

There is not time this afternoon to talk about the 55 successful earth satellites the United States has launched, the two sun satellites -- with one of which, Pioneer V, we kept contact for a record 22,500,000 miles -- and our two deep space probes. However, I would like to sketch briefly a few points illustrating how the space technology we are developing has already begun to be of value to our country and to other nations.

For example, the TIROS III weather satellite, launched last July 12, located and televised pictures of seven of the eight hurricanes that struck our Atlantic Coast this season. This satellite found Hurricane Esther two days before conventional weather aircraft spotted the storm.

In the far Pacific, one storm observed by aircraft seemed to be dying out and the weather services of the nations concerned called in their planes on September 22. Two days later, however, TIROS pictures warned that the storm had been regenerated and it became Typhoon Sally.

TIROS information has been a boon to the West Coast fishing industry by supplying warnings of a number of storms off the California coast. Further, information from infrared sensors on the TIROS satellites have initiated a whole new effort to measure, both day and night, the balance between the heat absorbed by the earth and radiated by it, and the effects of changes in this heat balance on weather.

Most of you have seen the 100-feet balloon communications satellite Echo, one of the brightest objects in the sky, launched more than a year ago. It is still aloft and still useful as a radio reflector.

Communications satellites will make possible cheaper and more reliable transoceanic telephone and telegraph service and instantaneous transmission of great quantities of information between the continents, and ultimately world-wide television. For example, through use of these satellites, the day may come when you could have the closing prices from every major market and exchange in the world available here in Chicago within minutes, or feed data on problems requiring computer processing in a country in Africa into a computer center here in Chicago.

NASA is developing several different communication satellite techniques. Among these is the bigger Echo balloon, 140 feet in diameter, with a more rigid structure to enable it more nearly to retain its shape as it moves through space. There are two other NASA programs for the development of communication satellites that will act as relay stations in orbit, rather than as simple reflecting mirrors. In addition, the American Telephone & Telegraph Co. is supporting a project to test its own ideas of how relay satellites should be built. One of these methods will be chosen for an operational communications system. It has been speculated that the satellite system may have progressed enough by 1964 that we shall be able to watch the Tokyo Olympic Games on television at home.

Other practical benefits of space technology are coming along. The goal of landing men on the moon and returning them within this decade will greatly expand our nation's capacity in science, engineering, and technology.

It has been our history as a nation that, whenever we have engaged in a major technological enterprise, the feedback into the private sector of the economy has been enormous. The World War II atom bomb project spurred vast development of nuclear energy and radio-isotopes in America. Military advances in aeronautics have helped our aviation industry gain and hold its position of world leadership. Postwar aerospace developments have brought about large-scale expansion and progress in the electronics industry.

It should be no surprise that we have already begun to reap benefits from space programs of recent years. For example, American industry has developed a valuable technology of utilizing very low temperatures to satisfy requirements established first for atomic energy and then on a larger scale for rockets.

Liquid oxygen -- now that we have learned to produce it in huge volume as a rocket propellant -- is finding wide use in the steel industry to make open hearth furnaces burn hotter and cleaner, and thus to make high-grade steel cheaper. Liquid nitrogen, a by-product of liquid oxygen manufacturing, is used to freeze whole blood for storage and to produce fresher-tasting orange juice than could be accomplished by previous freezing processes.

There is a host of other applications. The most interesting are yet to come. They await the juncture of the idea, the need, and the man or company with funds and imagination to bring them out. We are just at the beginning of an age of profound scientific and technological change whose end none of us can foresee.

Our new manned and unmanned space science, exploration, and application programs constitute the largest peacetime research and development endeavor in the history of our country. The technology developed and fed back into our economy will be correspondingly large.

No single organization can carry out so ambitious a program. No agency has a monopoly on the skills, the missions, or the requirements. The space program is and must continue to be national in scope. In carrying out its portion of the responsibility, NASA will continue to cooperate with private industry, universities, non-profit laboratories, and other government agencies -- the Department of Defense, the Atomic Energy Commission, the Weather Bureau, the Federal Communications Commission, the Federal Aviation Agency, the National Science Foundation, the National Academy of Sciences and others.

For example, we are working jointly with the Atomic Energy Commission on the Rover nuclear rocket and on programs to develop electric power sources for use in space. We are pulling in harness with the Weather Bureau of the Department of Commerce to develop an operational system for launching weather satellites. In similar fashion, we are working closely with other agencies.

In total, the objectives of our national space effort were well stated by Senator Robert S. Kerr, Chairman of the Senate Committee on Aeronautical and Space Sciences, when he said, "I am convinced that the nation which leads in exploring and using space for peaceful purposes can best build, improve, and inherit the earth."

I myself believe he is profoundly right.

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